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Potato growing in Iowa

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POTATO GROWING IN IOWA

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Iowa does not grow enough potatoes to supply its own needs. The average yield is about 100 bushels per acre. Because of high summer temperatures and uneven distribution of rainfall during the growing season, the climate is not ideal for the production of potatoes. However, yields in farm and home gardens could easily be doubled by following the practices outlined here. Several large commercial growers in Iowa average 400 to 500 bushels per acre of marketable potatoes each year.

**CHOOSE BEST SOIL**

An ideal potato soil should be high in fertility, friable, deep, high in organic matter, and should have an acid to slightly acid reaction. Soil type definitely influences the shape of the tuber. Light, well-aerated soils produce better shaped tubers than heavy soils. Sandy soils are excellent for early potatoes, but in dry seasons the crop may suffer from lack of moisture. Heavy clays fail to produce tubers of good quality or shape. Sandy loams and medium loams are the most satisfactory upland soils. Much of the commercial acreage in Iowa is on peat and muck. They are excellent potato soils when they have adequate drainage. Because of their high percentage of organic matter and lower temperature, they yield more heavily than mineral or upland soils, when properly managed.

Clover, alfalfa and sweetclover sods plowed under are excellent for increasing organic matter and nitrogen. Alsike, rye, soybeans and similar acid-tolerant crops are often preferable, as they can be grown without liming. Potatoes should follow a cultivated crop; therefore it is advisable to have a rotation such as legumes, corn and potatoes.

Scab, which is one of the most serious diseases of potatoes, is less prevalent on acid or slightly acid soils than on neutral or alkaline soils.
Deep fall plowing is advised, followed by thorough disk ing and harrowing before planting.

**POTATOES NEED FERTILIZER**

Potatoes are heavy users of soil nutrients. Compared with most farm crops they use especially large amounts of potash. A crop of 150 bushels of potatoes will remove about as much nitrogen and phosphoric acid as 25 bushels of wheat or 50 bushels of oats, and five or six times as much potash as wheat or oats.

There is a long-standing belief that using farm manures as potato fertilizers, especially when the manure is fresh, encourages the development of scab. Omission of stable manure, however, is no insurance against scab infection. If the soil or the seed is infested, scab will attack the tubers whenever moisture, temperature, aeration or acidity conditions in the soil are favorable for growth of the scab organism. In spite, therefore, of the possible danger of encouraging scab infection, stable manure is a good potato fertilizer. It supplies organic matter, and it is improved by adding 40 to 50 pounds of superphosphate to each ton of manure. Apply the manure just before plowing, the fall before the potatoes are planted, and either apply superphosphate just before seedbed preparation or else sow with a fertilizer attachment on the planter as the seed is planted.

Usually potatoes will respond to superphosphate applications on any Iowa soil. They will respond to potash applications on many soils, since potatoes are heavy users of potash. Peats and mucks are uniformly deficient in potash and phosphates and should have applications of 500 to 800 pounds per acre of 0-9-27 fertilizer. Sandy soils need a complete fertilizer such as 500-700 pounds of 3-9-18, and sandy loams, 500 pounds of 4-16-8.

Up-to-date potato planters have fertilizer attachments which place the fertilizer in bands near the seed-piece zone. Farmers who do not have special tools for planting and fertilizing should broadcast the fertilizer before spring plowing or, if the field is fall-plowed, before cultivating in preparation for planting. In the home garden the fertilizer may...
be applied in the open furrow between the seed pieces, but it should not touch them as it may injure the starting sprouts.

WHAT ABOUT VARIETIES?

The Irish Cobbler is the most reliable all-round variety for Iowa. It has deep eyes and is susceptible to scab, but it yields well, grows vigorously, is early, is a good storage variety and has fairly good quality.

The Early Ohio is a high-quality early potato, but it will yield far less than the Cobbler. Under poor growing conditions, it is likely to have knobby tubers and growth cracks.

Rurals should not be grown on peat, but may be grown with fair success on loam soils. They are rather late maturing and do not produce large yields.

Warba and Red Warba are earlier than Cobbler, but when soil moisture is low the tubers are small. On heavy soils they produce very rough tubers. On account of its earliness, Warba is a good home garden variety for immediate table use. It is not recommended for storage.

The Pontiac, a Michigan introduction, is an attractive red-skin variety but low in table quality. It is highly susceptible to scab. On sandy, acid soils it is satisfactory but is not recommended for general planting.

Sebago, a late, white-skin potato, can be grown on peat or upland soils. It has reasonably good cooking quality, is partially resistant to scab, and its yields are satisfactory.

Chippewa and Katahdin are not recommended for peat soils, but on upland soils they are satisfactory when grown in rotation where soils have large amounts of organic matter. These varieties are only fair in cooking quality and are highly susceptible to scab.

Kennebec, a recent introduction by the USDA, is very late maturing and produces rough tubers on most soils. It is not recommended for general planting because of lateness of maturity.

Russet Burbank, commonly called Russet or Idaho Russet, should not be grown in Iowa. It is one of the finest quality potatoes on the market when produced under irrigation in
Fig. 1. It pays to plant recommended varieties. Occasionally an Iowa home gardener, having a high opinion of the Russet Burbank from Idaho, will plant some. This is about what he gets. The variety is not adapted here.

The Triumph or Bliss Triumph, a red potato commonly found in Iowa markets, likewise is not adapted to Iowa. The variety does not yield well, and the tubers have poor cooking quality, are deep eyed and susceptible to scab. Plant Red Warba in place of this variety.

Cayuga and Ontario produce tubers of fair quality, and are the most scab-resistant varieties now available. If scab is a serious problem, these varieties are satisfactory.

**PLANT DISEASE-FREE SEED**

Only healthy, disease-free seed potatoes should be planted. Good appearance of potatoes in the bin does not insure good planting stock, as they may be from infected plants and produce diseased progeny the following season. Even the
selection of apparently healthy hills in a field containing some diseased stock may result in diseased progeny. The surest way to get healthy planting stock is to use certified seed each year. In Iowa, all certified seed comes in sealed bags, tagged with a blue label on which is stated the name of the variety, its source, and the name of the certifying agency.

Certified seed potatoes should be used irrespective of the size of the planting. Certified seed sold in Iowa in the spring usually comes from Iowa, Minnesota and North Dakota. Certified seed usually may be obtained through local seed dealers and often in grocery stores. Where certified seed is not available locally, write the certifying agency of the states for a list of growers who have certified seed for sale. For Iowa-grown seed, write the Iowa Agricultural Experiment Association, Ames, Iowa; for Minnesota-grown certified seed, write the State Department of Agriculture, St. Paul, Minn., and for North Dakota-grown seed, write the Seed Commissioner, State Department of Agriculture, Fargo, N. D.

**SPROUT SEED BEFORE PLANTING**

Conditions should be such that seed pieces start to grow soon after planting. Sun sprouting or "greening" of seed potatoes is beneficial. The tubers should be exposed to moderate or subdued light for about 2 weeks before planting. The sprouts developed under these conditions will be short, green and vigorous. The sprouts from this seed will emerge from the soil earlier and the tubers will mature slightly earlier than sprouts from dormant tubers. Long spindly sprouts are not desirable, as they are easily broken off in handling and planting.

**SEED TREATMENT SOMETIMES HELPS**

The scab and scurf or Rhizoctonia organisms on seed potatoes should be killed by treating the seed with suitable chemicals. Scab appears on the tubers as corky areas; Rhizoctonia appears as black specks and brown stem lesions below the soil. The latter disease may also infect the stems and appear as brown lesions below ground. Sometimes
plants infected with Rhizoctonia will produce aerial tubers. Even though seed is treated, the new tubers may be infected because of the presence of these organisms in the soil. Planting certified seed or treating seed is no guarantee that tubers will not have scab if the soil is infested with the organism causing the disease. Potatoes should not be planted again on the same ground for 4 or 5 years in order to lessen the incidence of scab and Rhizoctonia.

Seed treatment is beneficial in preserving the seed piece when planting early. If the soil is cold and wet, seed treatment prevents rotting of the seed piece.

Seed treatments commonly recommended are as follows:

**Cold formaldehyde:** To 30 gallons of water, add 1 quart of 40 percent formaldehyde. Soak the potatoes 2 hours.

**Hot formaldehyde:** Add 1 pint of formaldehyde to 30 gallons of water. Heat the solution to 126° F. Soak the potatoes in crates or in sacks for 3 minutes in the solution, remove them from the solution and cover them for 1 hour. It is essential that the solution temperature be held from 123° to 126° F., for the treatment is ineffective at a lower temperature.

**Acid-mercury dip:** To 25 gallons of water, add 6 ounces of corrosive sublimate and 1 quart of hydrochloric acid. Soak the potatoes 10 to 15 minutes, then dry before cutting. This will treat 40 to 50 bushels of potatoes. Use wood or earthenware containers for this solution.

**Semesan Bel** is particularly adapted to the needs of the small home garden. It should be used according to the manufacturer’s directions.

Potatoes treated with formaldehyde may be used for food if all are not planted. Do not use potatoes treated with acid-mercury dip solution, as they are poisonous.

**PROPER PLANTING IS IMPORTANT**

**WHAT SIZE SEED PIECE?**

Highest yields are obtained when seed pieces weighing from 1 to 2 ounces are planted. Chunky seed pieces containing one or more eyes are desirable. Tubers weighing 6 to 8 ounces are ideal for cutting into four pieces, each weighing from $1\frac{1}{2}$ to 2 ounces, or about 10 pieces to the
A long 6-ounce tuber cut into four pieces.

A chunky 6-ounce tuber cut into four pieces.

A 4-ounce tuber cut into two pieces.

Fig. 2. Size of seed piece should be 1½ to 2 ounces. Single eyes or small seed pieces result in lower yields. Poor yields of potatoes will result if single-eye or small seed pieces are planted. The potato plant lives off the seed piece for several weeks, and the plant cannot obtain enough food from a single eye to make the vigorous growth needed for high yields.
ALWAYS PLANT EARLY

Experiments conducted by the Horticulture Section of the Iowa Agricultural Experiment Station show definitely that early planting produces the largest yields. Potatoes should be planted in our upland soils before it is safe to plant corn. Peat and muck soils as a rule cannot be worked as early as the upland soils, and planting may have to be delayed until a proper seedbed can be prepared. The best planting dates in Iowa will vary from early April in the south to the latter part of April in the northern part of the state. There is no evidence that the phase of the moon has any influence on the growth and yield of the potato plant. Potatoes should be planted early and when the soil is in good condition regardless of whether it is “in the light or dark of the moon.”

SPACE ACCORDING TO SOIL

On upland soils, the rows should be spaced 36 inches apart and the seed pieces 12 to 15 inches apart in the row. On peat and muck, closer spacing, with rows as close as 32 inches and seed pieces 10 inches apart in the row, has the advantage of producing a larger yield of more evenly sized tubers. With closer spacing, the leaves will interlace and provide a canopy over the soil. This canopy will keep the soil temperature lower and may be of some protection against unseasonal frosts, common on peat. Somewhat more seed is required for closer spacing.

HOW DEEP TO PLANT

The usual planting depth is 4 inches. In sandy soils 1 or 2 inches deeper is desirable. Cover the seed shallow with only 1 or 2 inches of soil, so that the soil will warm up sooner around the seed piece and hasten growth of the sprouts. In cultivation, fill in the planting trench after the sprouts are 6 inches or more high. With shallow covering, less Rhizoctonia damage to stems will occur. Modern potato planters are so constructed that they plant deep (4 inches or more) and cover shallow. The soil should be pressed firmly around the seed piece.
CULTIVATE SHALLOW, AT RIGHT TIME

Cultivation should be shallow, since deep cultivation destroys the roots near the surface and does not increase the depth of penetration of the undamaged roots. When roots are cut off by the cultivator, the potato plants fail to utilize all the moisture and plant food in the upper and often richer soil. Timely cultivation is more important than frequent cultivation, since weed control is the primary purpose of cultivation. The grower should strive to destroy all weeds when they are very small. Hilling is not desirable unless the tubers are exposed to greening at the surface, because soil moisture is lower and soil temperatures are higher at the level of the tubers in ridged soil.

ALWAYS SPRAY OR DUST

Maximum yields cannot be obtained without adequate insect or disease control. It always pays to spray or dust any potato patch. Yield increases of as much as 50 to 150

Fig. 3. High-pressure spraying on large acreage to control pests. Yields may be doubled by planting certified seed and controlling pests with fungicides and insecticides.
bushels per acre are often secured by adequate spraying. Use a bordeaux mixture consisting of 8 pounds of crystalline copper sulfate, 4 pounds of hydrated lime and 2 pounds of 50 percent wettable DDT in 100 gallons of water. The bordeaux is for control of early and late blight and the DDT for control of insects such as the Colorado potato beetle, flea beetle and leafhopper.

The leafhopper causes serious damage and reduction in yield if not controlled. The injury to the leaves caused by this insect is often called blight but should not be confused with blight. Late blight is serious when temperatures are below normal and the humidity and rainfall above normal, whereas leafhopper injury is more serious when it is hot and dry.

The first spray should be applied at the rate of 125 to 150 gallons per acre for early sprays and 200 gallons per acre for later sprays as soon as the beetles or leafhoppers appear. Spraying should be repeated every 10 to 14 days until the leaves begin to die or until the vines are killed by frost. Usually four to six sprays are sufficient.

Fig. 4. Dusting to control pests in the home garden.
To make bordeaux mixture, dissolve powdered copper sulfate in a half tank of water in the sprayer, start the agitator and add the lime. The lime should be prepared in a container by adding water and stirring until a thick milk of lime is secured; then pour this into the sprayer through the strainer.

Commercial growers need very large sprayers with pressure pumps capable of delivering 15 to 20 gallons per minute at 400 pounds or more pressure per square inch. Sprayers of this type require tanks that will hold 200 to 400 gallons of liquid and spray 8 to 12 rows at one time. Such sprayers cause less wheel damage to the plants because they cover many rows at once, thus reducing the number of trips needed to cover the area.

For the home gardener, a spray containing 2 tablespoons of 50 percent wettable DDT powder in each gallon applied every 2 weeks throughout the growing season will control insects.

Dusting may be substituted for spraying, especially in the home garden. The dust will not adhere to the leaves as well as spray, and is not as effective as spray in controlling late blight.

Early morning, late evening or night dusting is more effective than day dusting because there is usually little or no wind to drift the dust. However, dusting is effective at any time when there is little or no wind movement. Prepared dusts for potatoes may be purchased. If late blight is not prevalent a satisfactory dust is one composed of 3 pounds of DDT plus 100 pounds of 325-mesh dusting sulfur applied at the rate of 40 pounds per acre per application.

**HARVEST CAREFULLY**

Potatoes can be dug and used when the vines are still green, but maximum size of tubers is obtained only if the vines are allowed to grow until the tops are dead. Pick up the potatoes within a few minutes after they are dug. Place them in the shade when they are dug during hot weather. Potatoes exposed to bright sunshine may become too warm and may rot in storage.
Potatoes should be handled carefully to avoid bruising in harvesting. Careful handling will improve keeping quality as well as appearance, for bruised potatoes are quite subject to rot in storage.

**RIGHT STORAGE IS IMPORTANT**

Potatoes should be stored clean and dry. Do not expose them to light in storage or they will become green due to chlorophyll formation, and this may result in a bitter flavor. Store at about 40° F. when possible. Little or no sprouting will occur at 50° to 60° F. for the first month or two, but for long keeping a lower temperature is essential. Do not store potatoes in large piles, as injury known as black heart may develop. Slatted bins should be used no more than 6 feet wide and 6 feet deep so that no potato is more than 3 feet from air. The storage place should be well ventilated.

Potatoes should not be allowed to freeze. Potatoes stored near the freezing point for any length of time become sweet tasting and unpalatable.

**WHAT ABOUT SPROUT INHIBITORS?**

Considerable publicity has been given to chemicals for use in treating potatoes to prevent sprouting. The methyl ester of alphanaphthaleneacetic acid prevents or greatly retards the growth of sprouts. This chemical is the active ingredient in various products sold under such names as Barsprout, Dow Sprout Inhibitor, Potato Fix, Spud-Keep, Stop Sprout, etc.

One method of treating has been to impregnate shredded or confetti paper with the chemical and distribute this through the potatoes. Another process has been to incorporate the chemical in a talc dust, and dust the potatoes. A third process is to use it in diluted liquid form and apply it as a fine mist on the tubers as they are bagged or placed in bins. For home use the dust application is the easiest. If potatoes treated with this chemical are stored at high temperatures, they will sprout but at a slower rate than untreated potatoes. The chemical should never be used on seed potatoes.